

DISCUSSION OF THE CLAIMS

Claims 25-27, 30-34, 37-40, and 42-50 are active in the present application. Claims 1-24, 28-29, 35-36, and 41 are canceled claims. Claim 50 is a new claim. Support for the new claim is found in the original claims.

No new matter is added.

REMARKS

Those of skill in the art readily recognize that the preparation and/or synthesis of water-soluble ionic polymers is burdened with some unique complications. Applicants describe these complications in the original specification (see the last paragraph on page 1 of the specification). While synthetic processes for making cationic polymers have been known such processes require the formation of the polymer in an aqueous salt or salt solution. The resulting cationic polymer is insoluble in the salt solution and may precipitate. Prior art patents such as US 4,929,655 and US 5,006,590 make it clear that such processes are useful essentially only for forming cationically charged water-soluble polymers. The aforementioned patents disclosed the following in this regard:

A dispersion of a water-soluble cationic polymer can be prepared by dissolving the above monomer in the aqueous solution and carrying out the polymerization in the presence of the above two polymers.

See the Abstract of the US 5,006,590 patent and the “Summary of the Invention” of the US 4,929,655 patent.

Conventional methods of forming cationic polymers are therefore practically useless for forming anionic polymers. The present invention is directed to a method for preparing a water-soluble anionic polymer dispersion. Applicants disclose and claim a process for making an anionic polymer (see the preamble and body of independent Claim 25 and new Claim 50).

The processes of present Claims 25 and 50 require a staged addition of a polymeric dispersing agent identified as the “polymeric dispersing agent B”. In the presently claimed method an amount of a polymeric dispersing agent is added during the polymerization of a mixture of monomers that includes ionic monomers. Subsequent to polymerization a further amount of the polymeric dispersing agent B is added.

The examples of the present specification prove that a particularly advantageous effect is achieved when an anionic polymer is made according to the process of the present claims. For convenience Applicants summarize examples from the original specification in a single table below.

example		polypotassium acrylate [%]			product viscosity [mPas]		storage
		(before)	(after)	Σ	after manufacture	after storage	40 °C
comparative	14	2.98	0	2.98	xxx	xxx	xxx
	15	4.97	0	4.97	xxx	xxx	xxx
	16	10.43	0	10.43	110,000	xxx	xxx
	17	4.37	6.05	10.42	xxx	xxx	xxx
inventive	18	7.06	3.36	10.42	15,200	21,200	liquid

xxx viscosity measurement not possible due to high viscosity

The data above demonstrate the remarkable effect achieved by staging the addition of an anionic polymeric dispersing agent during the free radical polymerization of anionic monomers in an aqueous system. Example 18 is inventive and adheres to the present claim limitation, i.e., more than 5 wt% of a first portion of a polymeric dispersing agent is added during polymerization to yield a water-in-water polymer dispersion having advantageous viscosity and stability properties.

Examples 14-17 are comparative and describe processes in which less than 5 wt% of an anionic polymeric dispersing agent is added to an aqueous polymerization and/or no polymeric dispersant agent is added subsequent to polymerization. For example, comparative examples 14 and 15 include complete addition of a polymeric dispersing agent to a polymerization without any post-polymerization addition. The polymeric dispersing agent is added in an amount of less than 5 wt%. The resulting polymer dispersion does not have acceptable viscosity or storage stability properties. Example 16 describes a process in which an entire amount of a polymeric dispersing agent of an amount of more than 5 wt% is added

to a polymerization. Again, the resulting polymer dispersion has unacceptable viscosity and storage stability properties.

Comparative example 17 shows the effect on the resulting polymer composition when the polymeric dispersing agent is added in two stages but the first stage addition includes an amount of polymeric dispersing agent that is less than 5 wt%. Example 17 like examples 14-16 is unable to provide acceptable viscosity or storage stability.

Only inventive 18 provides a polymer dispersion that gives the desirable viscosity and storage stability properties. Unlike the comparative examples Inventive Example 18 can be stored for long periods at elevated temperature (i.e., 40°C) and remain in a liquid state. Likewise, inventive example 18 provides a composition having a relatively low viscosity (compare the viscosity of 15,200 mPas for inventive example 18 with a viscosity of 110,000 mPas for example 16).

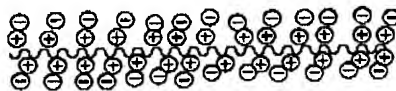
Nothing in the art of record discloses or suggests that a particular two-stage addition of a polymeric dispersing agent to an aqueous polymerization system can provide a polymer dispersion containing an anionic polymer where such polymer dispersion has advantageous viscosity and storage stability properties.

The Office rejected the previously pending claims over Fischer (US 2004/0034145) in combination with Aydin (US 5,340,859) and Hurlock (US 6,265,477) also in combination with Aydin.

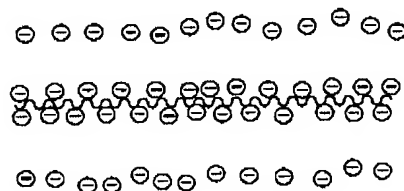
First, Applicants point out that the Fischer process is substantially different from the process of the present claims. Fischer, in contrast to the presently claimed invention, describes a process for forming a **cationic** polymer. Fischer nowhere discloses or suggests the inclusion of an anionic monomer and/or a process for making an **anionic** polymer. At best, Fischer describes polymers made by polymerizing a mixture of non-ionic, cationic or amphiphilic monomers.

The process of Fischer stands in stark contrast to the process of the present claims. Where Fischer describes the polymerization of a cationic material to form a cationic polymer, the present claims are expressly drawn to a process for making an anionic polymer. Applicants submit that those of ordinary skill in the art would not be led to believe that the process of Fischer would be in any way relevant to a process for making an anionic polymer such as that presently claimed.

Moreover, in addition to the factual basis provided above, Applicants submit that those of skill in the art would have additional technical reasons to believe that the Fischer process is inappropriate for making anionic polymers. For example, a mixture of a water-soluble acid and a positively charged polymer (e.g., a polymer containing cationic monomer groups) causes interaction between positive and negative charges as shown in the diagram below.



If one of ordinary skill in the art attempted to replicate the Fischer process for making an anionic polymer substantial difficulties would result. The schematic below shows how an anionic polymer interacts with anions in an anionic biased solution. Any negative charges on the polymer chain would naturally repel negative charges in the aqueous matrix. Such an environment would be unsuitable for the preparation and/or isolation of an anionic polymer.



Applicants thus submit that withdrawal of the rejection is appropriate.

With respect to the rejection in view of the Hurlock reference, Applicants point out that the cited art describes a process in which a polymerization is carried out in the presence of a polymeric dispersing agent that is different from the polymeric dispersing agent described in the present claims. Hurlock describes the prior art stabilizer as follows:

. . . anionic water-soluble stabilizer polymer containing from about 1.25 to about 20 mole percent 2-acrylamido-2-methyl-1-propanesulfonic acid.

See the Abstract of Hurlock.

The stabilizer of Hurlock is exclusive of the polymeric dispersing agent of the present claims. Where Hurlock describes a stabilizer which may have up to 20 mole % of an ionic monomer unit, the presently claimed invention requires the presence of a polymeric dispersing agent which contains at least 30% by weight of anionic monomers (e.g., ionic monomers).

Applicants thus submit that the rejection of the claims in view of Fischer and/or Hurlock should be withdrawn for the reason that the particular conditions recited in the present claims; namely, the formation of an anionic polymer and the inclusion of a polymer dispersing agent having at least 30 wt% of anionic monomers, defines a process that is exclusive of the Fischer and Hurlock processes.

Further still, nothing in the cited art discloses or suggests that the use of a two-stage addition of a polymeric dispersing agent can provide a process which forms a polymer dispersion having substantially improved viscosity and storage stability properties. As discussed above, Applicants have shown that a polymer dispersion formed according to the claimed invention is substantially superior to polymers formed in processes that do not include the two-stage addition of a polymeric dispersing agent. Applicants demonstrated the criticality of this strategy of adding the polymeric dispersing agent in two stages and showed that the process of the present claims provides a product that is substantially different from

processes which do not adhere to the two-stage polymeric dispersant agent methodology of the present claims.

The Office even acknowledges that the Fischer and Hurlock references do not disclose the two stage addition feature of the present claims but relies on Aydin (US 5,340,859) to cure this deficiency of the Fischer and Hurlock references. While Aydin may broadly disclose the post polymerization treatment of a polymerization reaction product with a surface active substance, such substances are different from the polymeric dispersing agent B of the present claims.

As already discussed above, the polymeric dispersing agent of the present claims is one that includes at least 30% by weight of anionic monomers. The post polymerization stabilization of the Aydin patent includes protective colloids and materials having a molecular weight below 1,000 (see column 5, lines 28-66 of Aydin). For the sake of argument only, if the Office's other assertions were correct, the combination of Fischer and Aydin or the combination of Hurlock and Aydin would not lead to the presently claimed invention because the cited art does not describe a process which include post polymerization treatment with dispersing agent that includes at least 30% by weight of anionic monomers.

Applicants thus further submit that the rejection should be withdrawn.

For the reasons discussed above in detail, Applicants submit that withdrawal of the rejections is appropriate. Applicants respectfully request the mailing of a Notice of Allowance.

Respectfully submitted,

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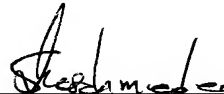
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